

Comprehensive Assessment & Monitoring Program (CAMP)

Implementation Plan



EXECUTIVE SUMMARY

INTRODUCTION

The Central Valley Project Improvement Act (CVPIA) was enacted in October 1992. Section 3406(b) of the CVPIA directs the U.S. Fish and Wildlife Service (USFWS) to develop and implement a series of restoration programs and actions for fish and wildlife purposes. The Act specifies that these actions should ensure that by 2002 the natural production of anadromous fish in Central Valley streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during 1967-1991.

The Anadromous Fish Restoration Program (AFRP) was initiated in response to Section 3406(b)1 of the CVPIA. The AFRP established baseline production numbers on Central Valley rivers and streams for naturally produced chinook salmon (all races), steelhead trout, striped bass, American shad, white sturgeon, and green sturgeon. The baseline fish production numbers were based upon monitoring information collected from 1967-1991. The AFRP established anadromous fish production targets based upon the baseline fish production numbers. The fish production targets represent a doubling of the baseline (1967-1991) numbers.

Section 3406(b) of the CVPIA provides the USFWS with the means to meet the anadromous fish production targets. This section of the Act [exclusive of (b)(16),(18),(22), and (23)] specifies a series of restoration actions that will be implemented over time throughout the Central Valley. The actions can be categorized as either water management modifications, structural modifications, habitat restoration, or fish screens. Figure S-1 illustrates the general locations where these categories of Section 3406(b) CVPIA actions will be implemented.

COMPREHENSIVE ASSESSMENT AND MONITORING PROGRAM

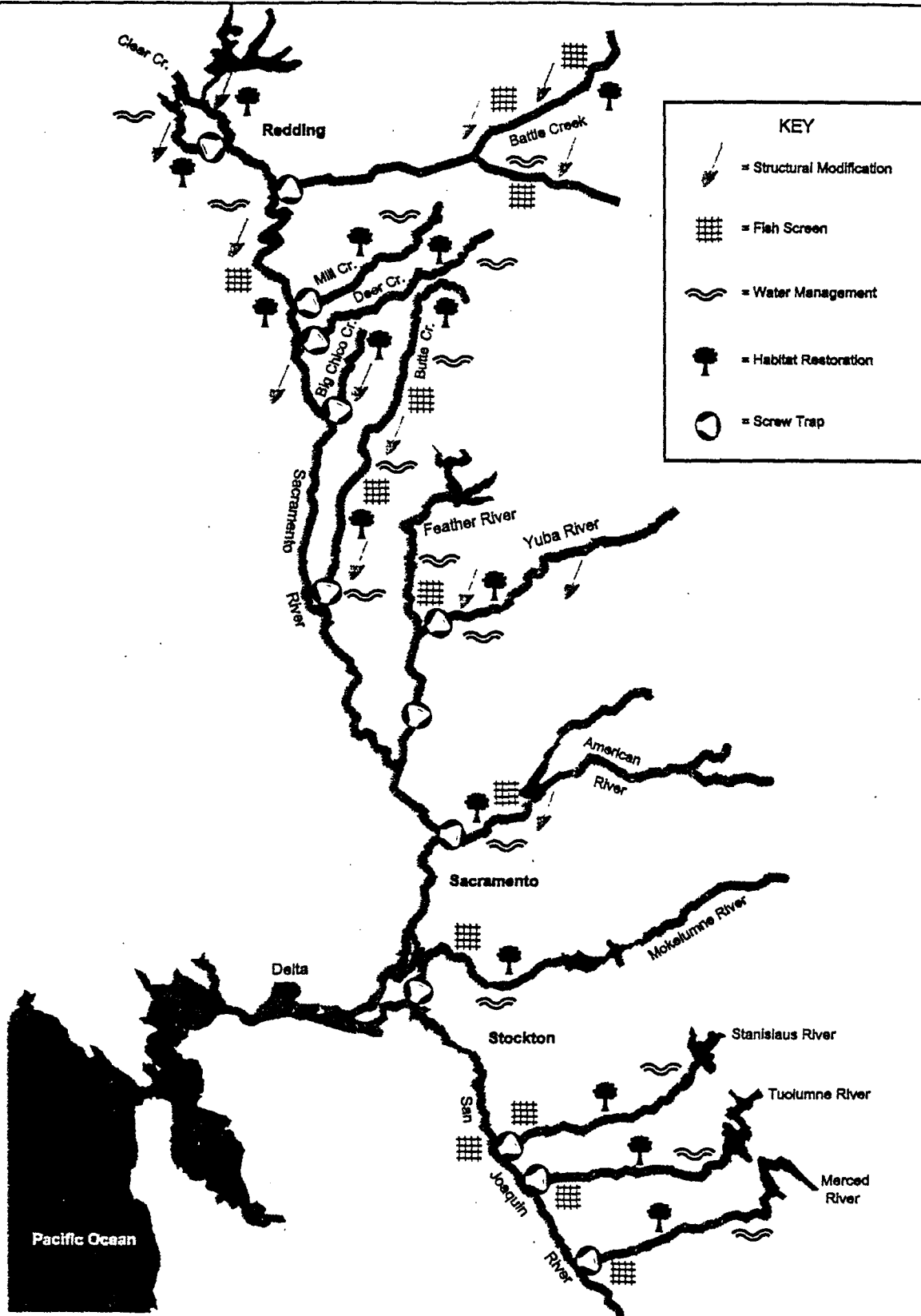
Section 3406(b)(16) of the Act specifies the development of a monitoring and assessment program to evaluate the effectiveness of implemented actions. The "Comprehensive Assessment and Monitoring Program (CAMP)" has been developed for this purpose.

CAMP is focused on meeting two distinct objectives:

- (1) to assess the **overall** (cumulative) effectiveness of actions implemented pursuant to CVPIA Section 3406(b) in meeting AFRP production targets and
- (2) to assess the **relative** effectiveness of categories of Section 3406(b) actions (e.g., water management modifications, structural modifications, habitat restoration, and fish screens) toward meeting AFRP production targets.

FIGURE S-1

Juvenile Chinook Salmon Monitoring Recommendations and Categories of CVPIA Restoration Actions



CAMP is designed to be broad in scope and evaluate the general or system-wide results of the CVPIA rather than the performance of site-specific actions. The CAMP Conceptual Plan (CP) was released in 1995 for public review. The CAMP Implementation Plan (IP) has refined the Conceptual Plan's recommendations and added detailed watershed and system-wide adult production calculations, a recommended juvenile salmonid monitoring program, data analysis methods, data management protocols, and five-year budget and funding needs. The IP is the final phase in the CAMP planning process before implementation in 1997.

CAMP Recommended Monitoring Programs

Adult Monitoring

Progress toward meeting anadromous fish production targets will be based upon measurement of increases in adult production of chinook salmon (all races), steelhead trout, striped bass, American shad, white sturgeon and green sturgeon. The CAMP IP recommends a series of adult fish monitoring programs that will be used to calculate annual production estimates for each target species. The natural adult production of steelhead trout and chinook salmon (all races) in a watershed will be calculated as the sum of the in-river run, and the portions of the downstream harvest and ocean harvest associated with the watershed. Fish production trends will be developed by using the annual fish production numbers and comparing them to the 1967-1991 baseline fish production numbers. Because several generations of fish must be studied to get an accurate picture of their overall production status the adult monitoring program will need to be consistent and long-term (25-50 years). The adult monitoring programs recommended by CAMP are shown in Figure S-2.

Juvenile Monitoring

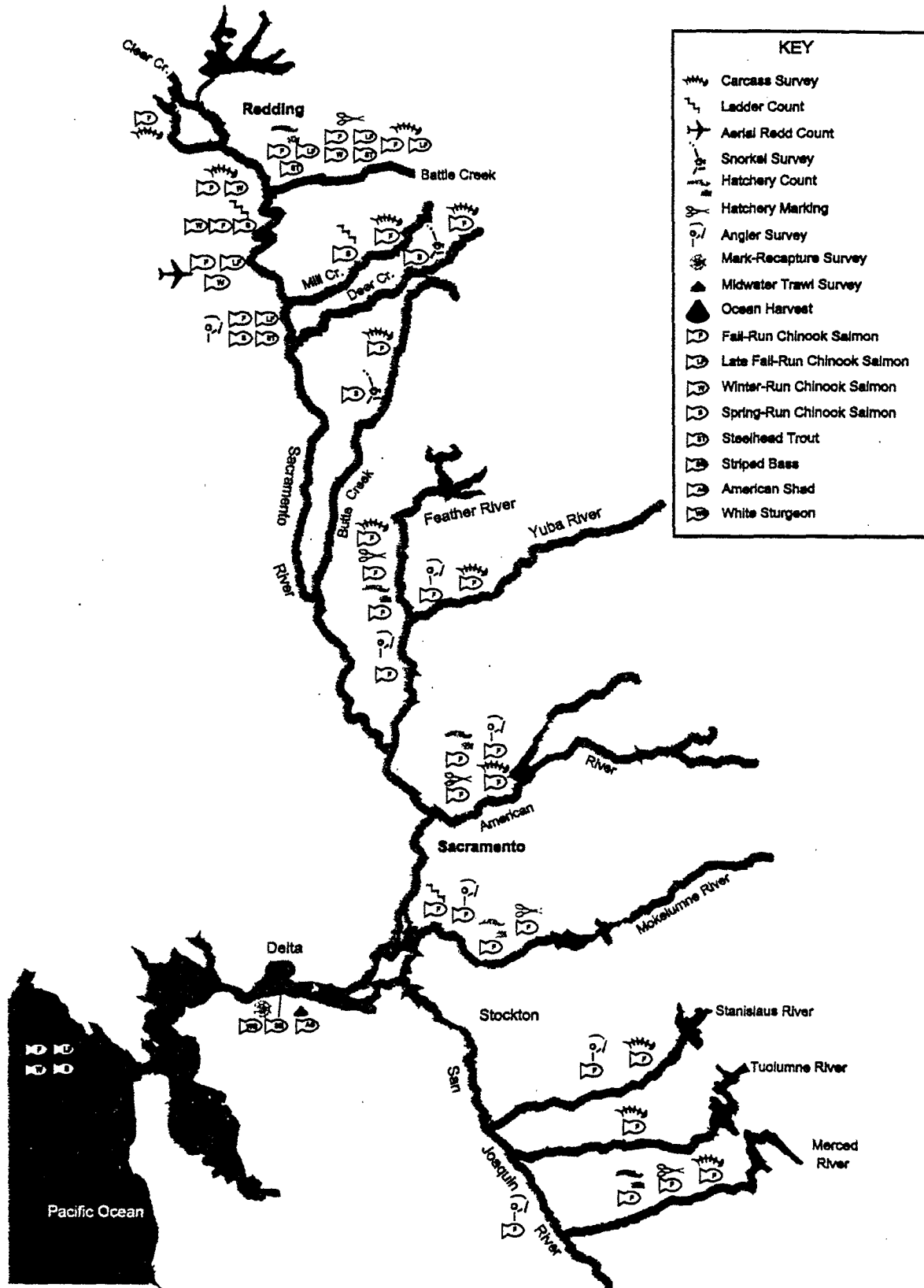
Juvenile chinook salmon were chosen to evaluate the relative effectiveness of the water management, structural, habitat restoration, and fish screen action categories in increasing anadromous fish production. Juvenile chinook salmon were selected for the following reasons:

- They will only be exposed to the categories of actions occurring in their natal streams,
- They are sufficiently abundant, and
- They are distributed widely throughout the Central Valley.

Rotary screw trapping is the recommended method for monitoring juvenile salmonids. Although several problems are associated with the use of screw traps, this method is more efficient over a relatively broad range of stream conditions than other available juvenile monitoring techniques (e.g., snorkel surveys, seining, electrofishing). CAMP recommended juvenile monitoring programs are shown in Figure S-1.

FIGURE S-2

Adult Monitoring Recommendations



Evaluation of Monitoring Results

The adult monitoring programs will result in a single production estimate for each anadromous fish species on each watershed where an AFRP production target has been set. The production estimates will be used to evaluate progress toward AFRP production targets using a modified version of the Pacific Salmon Commission's (PSC) rebuilding assessment methods. Two of PSC's three criteria involve the use of a "base to goal line" that uses a straight line to connect the mean baseline production and the production goal over the rebuilding period. The third, short term, criterion examines the recent production estimate for a species by determining if recent production is greater than for the previous year. Scores are assigned for each criterion and the total is used to determine if the species or race may be classified as "rebuilding".

The juvenile monitoring program data will be analyzed to evaluate action category effectiveness using a variety of qualitative and quantitative techniques. These techniques will include:

- Changes in juvenile abundance over time within each watershed prior to and following action implementation.
- Changes in juvenile abundance among watersheds.
- Integration of AFRP site-specific monitoring results into the CAMP evaluation.
- Use of adult spawner/juvenile abundance relationships to link the impact of actions that increase juvenile abundance to adult production.
- Changes in abiotic environmental variables compared to juvenile abundance estimates.

Qualitative and quantitative results will be examined together to assess the effectiveness of actions within any given watershed. Action categories will be compared by their cumulative total positive, negative, or neutral effects on juvenile abundance and ranked in terms of their summed effectiveness.

Data Management System Recommendations

The recommended monitoring programs are designed to collect the data needed to meet CAMP's objectives. The data management process addresses data compilation and entry procedures, data availability and timing constraints, data processing calculations, data storage formats, and data accessibility to multiple data providers and users.

The availability of adult monitoring data for entry into CAMP calculations will be determined by the data reporting schedules of agencies and the migration/spawning period of each fish species/race. Adult fish monitoring data will be acquired in summary format from annual agency reports. In comparison to adult data juvenile data will be a combination of raw (e.g. daily screw-trap estimates) and summary formats. Juvenile data will require a detailed qualitative and quantitative analysis. A set of quality assurance and control procedures, developed by the

Interagency Ecological Program (IEP), will be followed to ensure that field data are recorded accurately, and data for CAMP calculations are formatted properly.

The data compiled and entered into the CAMP database will be made available to a wide array of users through the use of an Internet home-page interface. In addition to data access, the home-page will serve as a mechanism to access a variety of information related to the overall CAMP process.

CAMP Budget and Funding Requirements

Budget estimates including the one and five year projected funding requirements for the the CAMP adult and juvenile monitoring programs, data management system, and staffing needs are summarized in Table S-1.

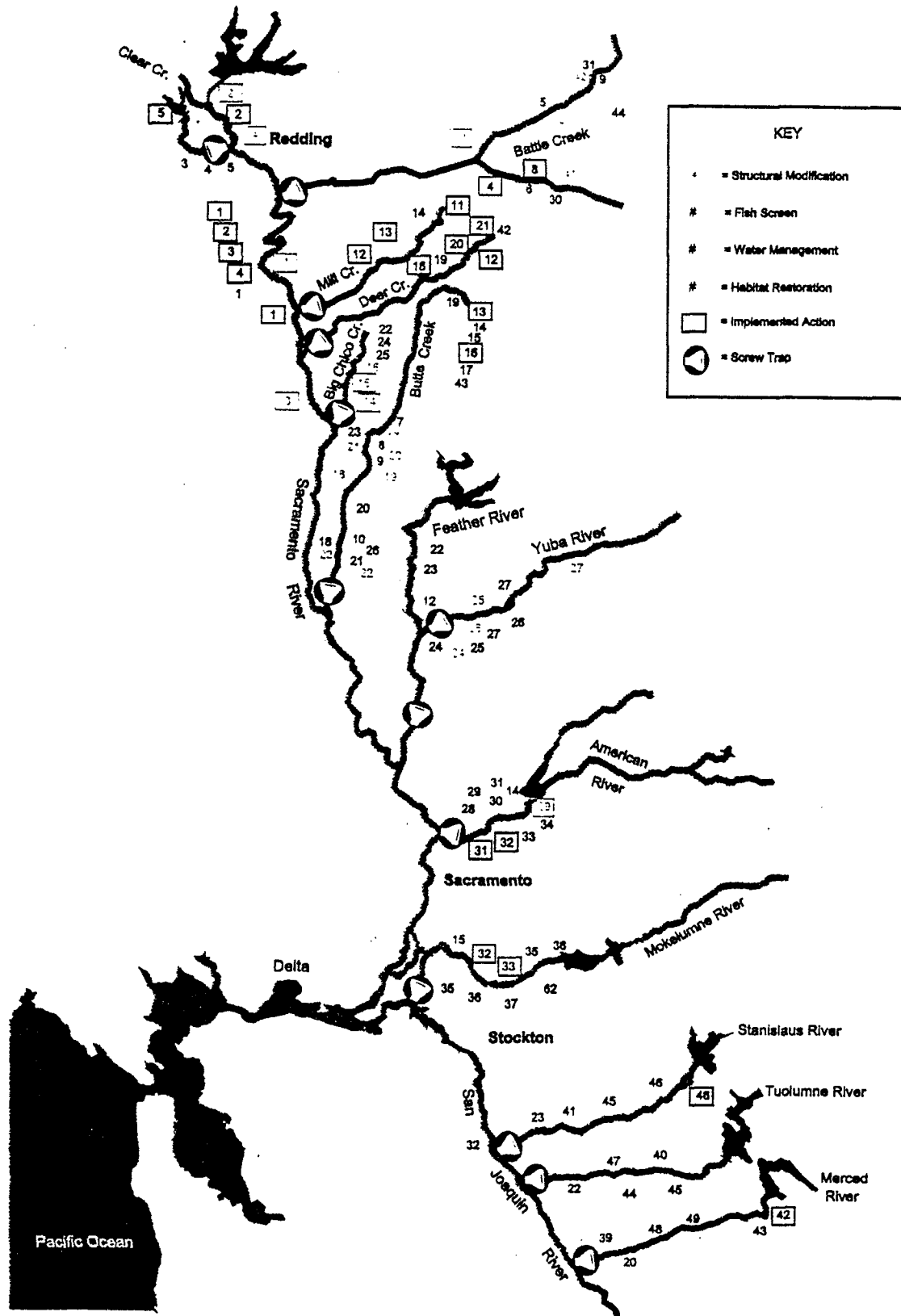
Table S-1. CAMP Budget and Funding Requirements

Project	Projected Budget		
	Program Costs (First Year)	CAMP Funding Requirements¹ (First Year)	CAMP Funding Requirements¹ (First 5 Years)
Field Monitoring	\$4,783,681	\$2,435,923	\$9,631,206
Data Management	\$ 132,316	\$132,316	\$661,580
Total	\$4,915,997	\$2,568,239	\$10,292,786

¹ CAMP Funding Requirements = Program Costs minus Existing Funded Programs

FIGURE 2-2

Juvenile Chinook Salmon Monitoring Recommendations and CVPIA Restoration Actions



Status of CVPIA Restoration Actions on CAMP Target Watersheds

Water Management

Watershed	Action No.	Action Description	Status
American River	31	Develop and implement river regulation plan	I(ongoing)
American River	32	Reduce flow fluctuations	I(ongoing)
American River	33	Modify timing and rate of diversions	N
American River	34	Improve flows for shad migration	N
Battle Creek	8	Increase flows past PG&E diversions	I(ongoing)
Butte Creek	13	Obtain additional instream flows	I(ongoing)
Butte Creek	14	Maintain minimum 40 cfs below Centerville D.D. ^a	N
Butte Creek	15	Purchase water rights	L
Butte Creek	16	Acquire water rights	I(ongoing)
Butte Creek	17	Adjudicate water rights	N
Butte Creek	18	Operational criteria for Sanborn Slough bifurcation	L
Butte Creek	19	Operational criteria for East and West Barrow pits	L
Butte Creek	20	Establish operational criteria for Nelson Slough	L
Butte Creek	21	Eliminate chinook stranding ^b	N
Clear Creek	5	Whiskeytown releases	I(ongoing)
Deer Creek	12	Improve instream flows	I(ongoing)
Feather River	22	Improve flows for chinook and steelhead	N
Feather River	23	Improve flows for shad migration	N
Merced River	42	Supplement flows	I(ongoing)
Merced River	43	Reduce adverse effects of flow fluctuations	N
Mill Creek	11	Provide instream flows	I(ongoing)
Mokelumne River	35	Improve flows for chinook and steelhead	N
Mokelumne River	36	Reduce flow fluctuations	N
Mokelumne River	37	Maintain suitable water temperatures	N
Mokelumne River	62	Establish and enforce water quality standards	N
Sacramento River	1	Flow regulation plan	I(ongoing)
Sacramento River	2	Flow change schedule	I(ongoing)
Sacramento River	3	Maintain water temperature	I(ongoing)
Sacramento River	4	Water quality amelioration	I(ongoing)
Stanislaus River	46	Supplement flows	I(ongoing)
Tuolumne River	44	Supplement flows	N
Tuolumne River	45	Reduce adverse effects of flow fluctuations	N
Yuba River	24	Improve flows for chinook and steelhead	N
Yuba River	25	Improve flows for shad migration	N
Yuba River	26	Reduce flow fluctuations	N
Yuba River	27	Maintain instream flows for temperature control	N

^a PG&E is not obligated to maintain 40 cfs during summer months.

^b As additional structural and operational projects are implemented chinook salmon stranding will be proportionally reduced.

I = Has Been or Will be Implemented in 1997

L = Will Likely be Implemented in 1997

N = Not Likely to be Implemented in 1997 but may be in the planning and development stages

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Status of CVPIA Restoration Actions on CAMP Target Watersheds

Habitat Restoration

Watershed	Action No.	Action Description	Status
American River	28	Develop a long-term water allocation plan	L
American River	29	Replenish spawning gravel ^a	L
American River	30	Improve and protect riparian habitat	N
American River	31	Terminate woody debris removal	N
Battle Creek	9	Improve fish passage in Eagle Canyon	N
Battle Creek	44	Develop regional conservation plan	L
Big Chico Creek	22	Replenish spawning gravel	N
Big Chico Creek	23	Improve cleaning procedures at One-Mile Pool	L
Big Chico Creek	24	Protect spring-run chinook summer holding pools	N
Big Chico Creek	25	Protect and revegetate riparian habitat	L
Butte Creek	26	Create buffer zones for urban development	L/N
Butte Creek	43	Develop comprehensive watershed management strategy	L
Clear Creek	3	Restore channel conditions	L/N
Clear Creek	4	Erosion control and stream protection	L/N
Clear Creek	5	Replenish gravel	L
Deer Creek	18	Protect and restore habitat	I(ongoing)
Deer Creek	19	Improve spawning habitats	N
Deer Creek	20	Maintain and restore riparian habitats	I(ongoing)
Deer Creek	21	Coordinate flood management activities	I(ongoing)
Deer Creek	42	Develop comprehensive watershed management strategy	L
Merced River	39	Restore and protect instream and riparian habitat	N
Merced River	48	Modify channel to isolate predators at Ratsloff Ranch	N
Merced River	49	Modify channel to isolate predators at Robinson Ranch	N
Mill Creek	12	Preserve habitat productivity	I(ongoing)
Mill Creek	13	Improve spawning habitats	I(ongoing)
Mill Creek	14	Restore riparian habitat	L
Mokelumne River	32	Replenish spawning gravel	I (ongoing)
Mokelumne River	33	Cleanse spawning gravel and prevent sedimentation	I (ongoing)
Mokelumne River	35	Enhance and maintain riparian corridor	N
Mokelumne River	36	Eliminate or restrict gravel mining	N
Sacramento River	1	Meander belt	I(ongoing)
Sacramento River	2	Spawning gravel restoration	I (ongoing)
Stanislaus River	41	Restore and protect instream and riparian habitat	N
Stanislaus River	45	Modify channel to isolate predators at Willms Pond	N
Stanislaus River	46	Replenish gravel below Goodwin Dam	N
Tuolumne River	40	Restore and protect instream and riparian habitat	N
Tuolumne River	47	Modify channel to isolate predators at Special Run Pool 9 & 10	N
Yuba River	27	Purchase streamband conservation easements	N

^a Starting in 1997 DFG will be evaluating salmonid spawning habitat improvement procedures.

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Status of CVPIA Restoration Actions on CAMP Target Watersheds

Fish Screens

Watershed	Action No.	Action Description	Status
American River	14	Improve fish screen	N
Battle Creek	4	Screen Orwick diversion	I(ongoing)
Battle Creek	5	Screen Coleman Powerhouse tailrace	N
Battle Creek	6	Screen PG&E diversions	N
Battle Creek	30	Rebuild fish screen on Wildcat Diversion Dam	N
Battle Creek	31	Rebuild fish screen on Eagle Canyon Diversion Dam	N
Butte Creek	7	Install fish screens at Durham Mutual Dam	L
Butte Creek	8	Install fish screens at Adams Dam	L/N
Butte Creek	9	Install fish screens at Gorrill Dam	L/N
Butte Creek	10	Install fish screen at White Mallard Dam	N
Merced River	20	Screen all diversions	N
Mokelumne River	15	Screen all diversions	N
Sacramento River	1	Anadromous Fish Screen Program	N
San Joaquin River	32	Install fish screen at Banta-Carbona, West Stanislaus, and El Soyo diversions	L
Stanislaus River	23	Screen all diversions	N
Tuolumne River	22	Screen all diversions	N
Yuba River	12	Improve and construct screens ^a	L

^a Only the Browns Valley Irrigation District diversion will be screened in 1997.

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Status of CVPIA Restoration Actions on CAMP Target Watersheds

Watershed	Action No.	Action Description	Status
American River	29	Reconfigure Folsom Dam shutters	I(complete)
Battle Creek	11	Chinook passage above CNFH ^a	I(complete)
Battle Creek	12	Gover Diversion dam barrier racks	N
Battle Creek	41	Rebuild fish ladder on Wildcat Diversion Dam	N
Battle Creek	42	Rebuild fish ladder on Eagle Canyon Diversion Dam	N
Big Chico Creek	14	Relocate and screen M&T Ranch diversion	I(complete)
Big Chico Creek	15	Repair Iron Canyon fish ladder	I(ongoing)
Big Chico Creek	16	Repair Lindo Channel weir and fishway	N
Butte Creek	17	Build new fish ladder at Durham Mutual Dam	L
Butte Creek	18	Remove Western Canal Dam	L
Butte Creek	19	Remove McPherrin and McGowan Dams	L
Butte Creek	20	Build new fish ladder at Adams Dam	L/N
Butte Creek	21	Build new fish ladder at Gorrill Dam	L/N
Butte Creek	22	Rebuild culvert at Drumheller Slough outfall	N
Butte Creek	23	Install a fish ladder at White Mallard Dam	N
Clear Creek	7	McCormick-Saeltzer fish passage	N
Sacramento River	1	RBDD operations	I(ongoing)
Sacramento River	2	Keswick Dam stilling basin escape channel	I(ongoing)
Sacramento River	3	GCID structural and operational modifications	I(ongoing)
Sacramento River	4	ACID operational modifications	I(ongoing)
Yuba River	24	Improve and construct bypasses	N
Yuba River	25	Modify fish ladder at Daguerre Point Dam ^b	N
Yuba River	26	Modify Daguerre Point Dam face ^b	N
Yuba River	27	Provide adequate water temperatures	N

^aHas been partially implemented and will be further implemented once disease issues at CNFH are addressed.

^bThese actions are in the planning stages and are anticipated for implementation in 1998-1999.

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